of these texts it was necessary to unite the skill of the Assyriologist with the accuracy of the photographer, for the former could only transcribe the characters more or less accurately, being powerless to give their exact shape and form, and the latter, while reproducing their exact shape and form, could only show the characters on the flat-sided tablets, those on the rounded edges remaining invisible. The Trustees of the British Museum, then, decided to print in cuneiform type a full transcript of the texts in characters as closely resembling the originals as possible, and in addition to give a number of characteristic specimens reproduced by the autotype process, so that the student who is unable to visit the Museum may be able to make himself thoroughly acquainted with the various complex and unusual forms of characters in which these tablets are written. In addition to the printed texts and autotype plates, a summary of the contents of each tablet is given, accompanied by notes, chiefly philological and geographical, which we believe will be of use to the reader. The summary is preceded by an introduction, in which the finding of the tablets and many points of interest concerning them are discussed in brief paragraphs. It will be remembered that some thirty years ago, when Sir Henry Rawlinson began to publish his monumental work, the "Cuneiform Inscriptions of Western Asia," he contemplated adding translations of all the texts given therein. It was, however, found impossible to do this satisfactorily; and notwithstanding Sir Henry's thirty years' additional labour on the Assyrian inscriptions, it would still be somewhat rash to publish word-for-word translations of such difficult texts as those from Tell el-Amarna. Plain, historical narrative, like the great Tiglath-Pileser inscription, could be and was well enough rendered into English by Sir Henry Rawlinson so far back as 1857; but letters and despatches of a new kind, containing words and forms hitherto unknown, cannot be thus treated. The summary of each tablet will tell the general reader what the tablet is about, and will help the student more than a literal translation of the verbose Oriental phrases would have done. In publishing these texts with autotype reproductions and summaries of contents, the Trustees of the British Museum have made a new departure, and we believe that the edition will be as useful to the general student of antiquity as to the cuneiform expert.

A TEXT-BOOK OF PHYSICS.

A Manual of Physics. By William Peddie, D.Sc., F.R.S.E. (London: Baillière, Tindall, and Cox, 1892.)

THE attempt made by Dr. Peddie to supply a manual of physics suitable for English students and English teachers is altogether worthy of praise, and his effort has undoubtedly been, on the whole, successful. The best works at present in use in higher schools and in colleges as text-books of physics are the well-known English translations of two French books, Ganot and Deschanel. These are, no doubt, excellent books in their way, and in the hands of able English translators the original French compilations have received great improvement. A recommendation also of these French books is to be found in the beautiful diagrams and pictures of experimental apparatus. These we miss in every English book, including the book before us. Nevertheless, even the modified and improved English translations are not altogether satisfactory for English teaching purposes, and Dr. Peddie's work, supplying a need which is very generally felt, will be most warmly welcomed.

The subject has been, on the whole, judiciously treated. It is compressed in an admirable way into very moderate compass. If, now and then, one feels regret that some particular portion has not been more fully dealt with, reflection on the moderate size of the book, and on the way in which each part is treated in the space prescribed to it by the author, often affords a timely and sufficient consolation.

While speaking about size and form, it may be remarked that the paper, the printing, and the binding, make this a pleasanter text-book to hold and to use than any which has appeared for many a day. In this respect the book can scarcely be too highly praised.

Commencing with four preliminary chapters, in which general laws are stated and explanations given as to certain necessary mathematical ideas and formulas, the author proceeds in chapter v. to the treatment of elementary kinematics; and in chapter vi. to the general principles of dynamics, including the general equations of fluid motion and of the equilibrium of a fluid. It is needless to say that these subjects are very briefly touched upon; but teachers will at any rate find a very succinct indication, to say the least, of the parts of mathematics and of dynamics which are most essential to a proper understanding of the physics which is to follow.

Chapters vii. to xiii. inclusive are devoted to properties of matter: general properties of solids, liquids, and gases are dealt with; a good account of gravitation is given; elasticity, diffusion, and the allied subjects, as well as cohesion and capillarity, are discussed; while in chapters xii. and xiii. we find a very fair account—short, of course—of atomic theories, including the modern kinetic theory of matter. Perhaps the chapters just referred to, on properties of matter, constitute the most thoroughly successful portion of the book. We cannot call to mind any book in which an account of these subjects so good, and in itself so complete, can be found. The remaining chapters—with the exception of the last two, which are devoted to the electromagnetic theory of light and "the ether"—treat in detail of sound, light, heat, electricity, and magnetism. It is in the last-named portion of the book that students will feel a want of fuller and more complete treatment. The subject of heat in particular will be felt by many to be unduly compressed, and the same must be said of parts at least of electrodynamics and electromagnetism.

A book such as we have described, covering so wide a field, and brought into the narrow limits of 500 small octavo pages, must obviously, if it be well arranged and well written, be an important contribution to our scientific literature. We have no hesitation in giving it high commendation. There is, perhaps, not much that is absolutely novel in the treatment of the subjects, or in the matter, but that is hardly to be expected in a manual of this kind: the novelty is rather to be seen in the idea of the production of such a book.

While thus giving to the author warm praise and congratulation, we cannot avoid noticing serious faults both of commission and omission. First it seems simply deplorable to drag quaternion notions and notation into an elementary book of this kind, unless it be to show how ridiculous the riders of the quaternion hobby can at times become. The explanations and definitions at the commencement of chapter v. will be nothing to the majority of learners and teachers but a mass of confusion thrown over one of the simplest and most important of subjects. To prove by quaternions the formula $S = VT$ (space described in a given time with constant velocity), which needs only a knowledge of the multiplication table; or the formula $x = \frac{1}{2}gt^2$ for falling bodies, which can be explained by common-sense (but not by quaternions) to a boy of twelve in half an hour, is simply inexcusable. Wherever quaternions are introduced in this book we find an easy matter made difficult—if not, as in the case of simple harmonic motion, absolutely unintelligible. Unfortunately, Dr. Peddie is not the first writer who has contrived, by means of quaternions, to make a subject unnecessarily difficult and repulsive.

But by far the most serious defect of this book, and it is one which will greatly mar both its usefulness as a text-book and also its popularity as a somewhat elementary work for reading and consultation, arises from the failure of its author to catch, even in a remote degree, the spirit which has animated and directed the whole of the best experimenting in physics for the last twenty-five or thirty years. *Et ignem regunt numeri* is the motto of Fourier's great work; and a realization of the fact that numbers (not merely numerical ratios) must be sought for as the crown of physical laws is that which has given pre-eminent value to the labours of experimenters during the last half-century, and has forced workers in this great field into precision and definiteness. The example set by Gauss and Weber, Joule and Thomson, and by the British Association Committee on Standards of Electrical Resistance appointed in 1861, has revolutionized ideas as to what is the ultimate object of experimenting in physics; and we can no longer be satisfied with knowledge as to almost any physical phenomenon until we are able to apply to the phenomenon and to our laws the searching test of arithmetical calculation in absolute numbers.

Unfortunately, in the book before us there is no recognition of these necessary conditions for completeness of knowledge, and very little recognition of recent investigations of the kind here indicated. The failure will be felt most seriously in the important subjects of heat, magnetism, and electricity.

In electricity there is not to be found the resistance, whether in ohms or in C.G.S. units, of any wire of any material! There are pages of algebra on dimensions of units, to puzzle the unfortunate learner, but nowhere can he find what an ohm, or ampere, or volt is: unless, "*ohm* = 10^9 *C.G.S.*" can be taken as a definition, when the meaning of a C.G.S. unit is not explained. Faraday's laws of electrolysis, got fifty years ago, are stated; but the determinations of Lord Rayleigh and Kohlrausch of the amount of silver deposited by an ampere current in a second are not even referred to. Tait's thermo-electric curves, and some forms of galvanic cells are described; but how to find the electromotive force of any one combination in volts is not indicated. We must not multiply instances. It would be only wearisome. Magnetism, electro-dynamics, are treated in precisely the same way; and the student would find it impossible to calculate from data in this book how much heat is conducted across a stone slab in an hour under given conditions, or how much heat is lost from the surface of a sooted globe in a minute, though there is a great deal of exposition of laws of heat exchanges, and of the algebra pertaining thereto. Diffusion of matter is another subject which suffers from defective treatment in a similar way. The word "diffusivity," introduced by Thomson, is correctly defined on p. 131; but ten lines lower down the definition is departed from, and a column of relative numbers is substituted for the now fairly known absolute diffusivities. A very thorough change of all these parts of the book ought to be made in a reprint or new edition, in order to make the work conformable to modern knowledge and requirements.

It would be ungracious to point out too many minor faults in a first edition; but a few must be mentioned. Faraday seems to have been forgotten in connection with liquefaction of gases! and Melloni, though not perhaps absolutely trustworthy, surely deserved to have his name mentioned in connection with radiation of heat. Mayer's name is not mentioned; and, whatever Dr. Peddie may think on the subject of the celebrated controversy, no one will agree with him that the name should be *omitted*. We cannot help feeling that there is too much local colouring about many parts of the book. A book of this kind is sadly marred by want of proportionate distribution of treatment; even the occupation of space with minute treatment of a favourite subject becomes an injustice with regard to those subjects which are unduly curtailed for want of more space. We trust it will not hurt the feelings of anyone if we remark that the book should be a little more cosmopolitan, and a good deal less Scotch.

On p. 337, there is a mistake which will bear comparison with Lord Brougham's celebrated idea that people carry weights on their heads to have them farther from the centre of the earth, and therefore less attracted. The formation of ice in "very hot" countries on shallow pools is compared with Faraday's experiment of freezing mercury in a white-hot crucible. It is radiation, not forced evaporation, which is the cause of the phenomenon referred to.

We regret, also, that Dr. Peddie has thought it advisable to follow the example of Maxwell and others in changing Andrews's diagram right for left. There is no reason for doing so. The diagram was much better as Andrews originally gave it; and it would be better also without the dotted line said to separate the region in which liquid and gas can exist together from the regions in which the substance is entirely liquid or entirely gaseous. The former is a region concerning which there has been much speculation of an unprofitable sort. The elementary student need not be troubled with it, and it cannot be explained to him in a single sentence.

On p. 95 there is a diagram of a cord being pulled through a tube. Perhaps it cannot be asserted that the diagram is absolutely wrong, because the cord is said in the text to be perfectly flexible. But the cord, passing round corners which look as if they were sharp angles, is so strikingly unlike anything which can be realized (and the results explained in this section can to a great extent be experimentally realized), that the diagram becomes at least misleading. If the corners are sharp by intention, then the diagram *is* absolutely wrong.

In spite of the faults and defects we have been obliged to notice, this book is, as we have said, an admirable attempt at a very worthy object, and with some remodelling it can be made into an excellent text-book. We wish it all success, feeling well satisfied that it meets a decided want.

OUR BOOK SHELF.

The Dietetic Value of Bread. By John Goodfellow, F.R.M.S. (London: Macmillan and Co.)

THIS book is another addition to the useful series of "Manuals for Students," published by Messrs. Macmillan and Co. The author states in his preface that the object of the work is twofold. First, to lay before the general public an account of the various kinds of bread, by which their merits may be judged; and, secondly, to afford technical information to students and others on the important subject of the true value of bread as a food. These objects have in every way been fulfilled. No one is more qualified to write such a book than Mr. Goodfellow, who by his previous writings has shown such a grasp of the subject with which he has to deal.

The first section of the volume is concerned with "Food, Diet, and Digestion." This is a very difficult matter to treat in a popular manner. It involves some of the most complicated problems of physiology. The author, however, has not shirked his task; anyone, however ignorant he may formerly have been on the processes by which food matters are rendered suitable for absorption and after-use by the human organism, if he reads through these pages carefully, cannot but help gaining much knowledge on the functions of the stomach and intestinal canal, and of the waste and work of the body.

The nature of the digestive fluids is not, of course, considered with the minuteness of detail necessary for a medical examination, but enough is said to render the following sections perfectly intelligible, although they are treated in a scientific manner.

"White Bread" is first considered. An introductory chapter is given describing the structure of the wheat grain, and the changes which flour undergoes when exposed to heat and the process of fermentation. Not only are the chemical and physiological properties of bread considered, but economical principles are gone into, and it is shown "that bread is one of the cheapest foods, not only with regard to the actual weight of nourishment obtained, but also with regard to the variety of the nutrient constituents; and the purchaser who expends his modest 2½*d.* in a 2-lb. loaf may rest assured that he could not spend his money to better advantage."

We further learn, however, that white bread is not a perfect food; those who partake of it should take care to supplement it largely with other foods, in order to make up for the lack of calcareous matter. On no account should it form part of the diet of children unless supplemented by milk or other foods rich in lime and phosphates.

Turning to "Whole-meal Bread," full descriptions are given of its composition, amount and nature of the salts present and their solubility; its digestibility, the waste present, and the action of bran on the intestine; its flavour, satiety, and dryness; and its effects on infants and children.

The ordinary whole-meal bread is not a desirable food, and far inferior to good white bread as regards the weight of actual nourishment and the thoroughness of the digestion. Its ingestion is often followed by diarrhœa, and the action of the bran increases the waste of food.

After a short consideration of some special forms of bread, such as "aërated," "bran," "rye" bread, &c., Mr. Goodfellow proceeds to speak of Meaby's Triticumina bread, of which he has a very high opinion, and believes that it is as near a perfect food as such a bread can be, and deserves the universal commendation which has been accorded to it by the medical and analytical world. "Germ," "diastase," "gluten" bread, &c., are then described, and the book finishes with short chapters on the diseases of bread and its medicinal properties.

To all who are interested in this subject, or wish to extend their knowledge of "the staff of life," we heartily recommend this volume.

Graduated Mathematical Exercises. Second Series. By A. T. Richardson, M.A. (London: Macmillan and Co., 1892.)

ON a previous occasion we have referred to the first series of exercises by Mr. Richardson. In these he led the student through a set of graduated examples, commencing with arithmetic and reaching those on cube root, compound interest, and quadratic equations.

In the present series, which is intended to be a continuation of the first, the relatively higher flights of mathematics have been dealt with. The problems have been arranged on the same lines, the more difficult of them being reached as advance is made, and include those on algebra, logarithms, trigonometry, mechanics, and analytical geometry.

An idea of the range over which each subject spreads can be gathered from the fact that all the problems will about suffice to cover such examinations as those of the Oxford and Cambridge Locals, and Army and Navy, allowing a small margin of safety.

Great care seems to have been taken to insure accuracy, every example having been worked out at least twice. For class work these examples will be found handy and a great saving of time, while for use at home the book should be widely employed.

Bibliothek des Professors der Zoologie und vergl. Anatomie, Dr. Ludwig von Graff, in Graz. (Leipzig: Wilhelm Engelmann, 1892.)

PROF. VON GRAFF is the lucky owner of a fine scientific library, which was formed mainly by Carl Theodor von Siebold, his father, and his grandfather, all of whom were professors. This library came into the possession of Prof. von Graff in 1882, and as it was too large for the modest dimensions of a German professor's house, he exchanged many books relating to practical medicine for zoological monographs and periodicals. At Graz the library is freely used by his assistants, pupils, and colleagues, and it is mainly for their benefit that the present catalogue has been issued. It consists of 337 closely printed pages, and is a compilation of considerable value, not only because it gives lists of authors and their works, but because of the admirable way in which the lists are arranged. The contents of the library are grouped under four headings—periodicals, auxiliary books (including works on University systems, bibliographical writings, dictionaries, &c.), *zoologia generalis*, and *zoologia specialis*.

The Canadian Guide-book. By Charles G. D. Roberts. (London: William Heinemann, 1892.)

TOURISTS and sportsmen in Canada ought to be very much obliged to Mr. Roberts for having provided them with this excellent Guide-book. The method he has adopted is that of Baedeker's Hand-books, and the result is in every way worthy of the models he has chosen. The work includes full descriptions of routes, cities, points of